

BARRIER FILM DEPOSITION OVER METAL FOR REDUCTION IN METAL  
DISHING AFTER CMP

## ABSTRACT OF THE DISCLOSURE

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A protective barrier layer, formed of a material such as titanium or titanium nitride for which removal by chemical mechanical polishing (CMP) is primarily mechanical rather than primarily chemical, formed on a conformal tungsten layer. During subsequent CMP to pattern the tungsten layer, upper topological regions of the protective barrier layer (such as those overlying interlevel dielectric regions) are removed first, exposing the tungsten under those regions to removal, while protective barrier layer regions over lower topological regions (such as openings within the interlevel dielectric) remain to prevent chemical attack of underlying tungsten. CMP patterned tungsten is thus substantially planar with the interlevel dielectric without dishing, even in large area tungsten structures such as MOS capacitor structures.